CLAIMS

What is claimed is:

1. A device, comprising an optical waveguide having a first grating, wherein:

at least a portion of the waveguide has a functional layer adapted to bind an analyte; and

when the analyte binds to the functional layer, the binding changes optical characteristics of the waveguide.

2. The device of claim 1, wherein:

a plurality of grooves in the optical waveguide form the first grating; and

at least some of the grooves are covered by the functional layer.

3. The device of claim 2, wherein:

the first grating has an optical reflection band characterized by a center wavelength; and

the binding shifts the center wavelength.

4. The device of claim 1, comprising two or more optical waveguides, each having a grating, wherein:

each grating has an optical reflection band characterized by a center wavelength; and

at least two gratings have different reflection bands.

5. The device of claim 4, further comprising an arrayed waveguide grating (AWG) having an input port and two or more output ports coupled to the two or more optical waveguides, wherein, for each optical waveguide, the AWG is adapted to route light having a corresponding center wavelength from the input port to the output port coupled to said optical waveguide.

6. The device of claim 5, wherein the AWG and the two or more optical waveguides are implemented in a single integrated device.

7. The device of claim 4, wherein at least two optical waveguides have different functional layers adapted to bind different analytes.

8. The device of claim 1, comprising a Mach-Zehnder interferometer (MZI) having two arms, wherein one arm includes the optical waveguide.

9. The device of claim 8, wherein:

the optical waveguide has a second grating; and

the first and second gratings form an optical resonator.

10. The device of claim 9, wherein:

a section of the optical waveguide between the first and second gratings has the functional layer; and

the binding changes a differential phase shift in the MZI.

11. The device of claim 1, wherein the first grating is a Bragg grating.

12. A method for detecting an analyte, comprising:

transmitting light through an optical waveguide having a first grating; and

measuring the transmitted light using a photo-detector, wherein:

at least a portion of the waveguide has a functional layer adapted to bind the analyte; and

when the analyte binds to the functional layer, the binding changes optical characteristics of the waveguide.

13. The method of claim 12, wherein the first grating is a Bragg grating.

14. The method of claim 12, wherein:

a plurality of grooves in the optical waveguide form the first grating; and

at least some of the grooves are covered by the functional layer.

15. The method of claim 14, wherein:

the first grating has an optical reflection band characterized by a center wavelength; and

the binding shifts the center wavelength.

16. The method of claim 12, comprising

transmitting light through two or more optical waveguides, each having a grating; and measuring the transmitted light using a plurality of photo-detectors, wherein:

each grating has an optical reflection band characterized by a center wavelength; and

at least two gratings have different reflection bands.

17. The method of claim 16, further comprising routing light via an arrayed waveguide grating (AWG) having an input port and two or more output ports coupled to the two or more optical waveguides, wherein, for each optical waveguide, the AWG is adapted to route light having a corresponding center wavelength from the input port to the output port coupled to said optical waveguide.

18. The method of claim 16, wherein at least two optical waveguides have different functional layers adapted to bind different analytes.

19. The method of claim 12, wherein the optical waveguide is a part of one arm of a Mach-Zehnder interferometer (MZI).

20. The method of claim 19, wherein:

the optical waveguide has a second grating; and

the first and second gratings form an optical resonator.

21. The method of claim 20, wherein:

a section of the optical waveguide between the first and second gratings is covered by the functional layer;

the binding changes a differential phase shift in the MZI; and.

measuring the transmitted light comprises measuring the differential phase shift.

22. A device, comprising a Mach-Zehnder interferometer (MZI) having two arms, wherein:

one arm has an optical resonator; and

a section of the resonator has a functional layer adapted to bind an analyte, wherein the optical characteristics of the resonator change, when the analyte binds to the functional layer.

23. The device of claim 22, wherein:

two Bragg gratings form the optical resonator;

the section having the functional layer is located between the gratings; and

the binding changes a differential phase shift in the MZI.

24. A method for detecting an analyte, comprising detecting a change in an optical characteristic of an optical waveguide, wherein:

at least a portion of the waveguide has a functional layer adapted to bind the analyte; and

when the analyte binds to the functional layer, the binding changes the optical characteristic.